5c015

SSBRP USER OPERATIONS FACILITY (UOF) OVERVIEW AND DEVELOPMENT STRATEGY

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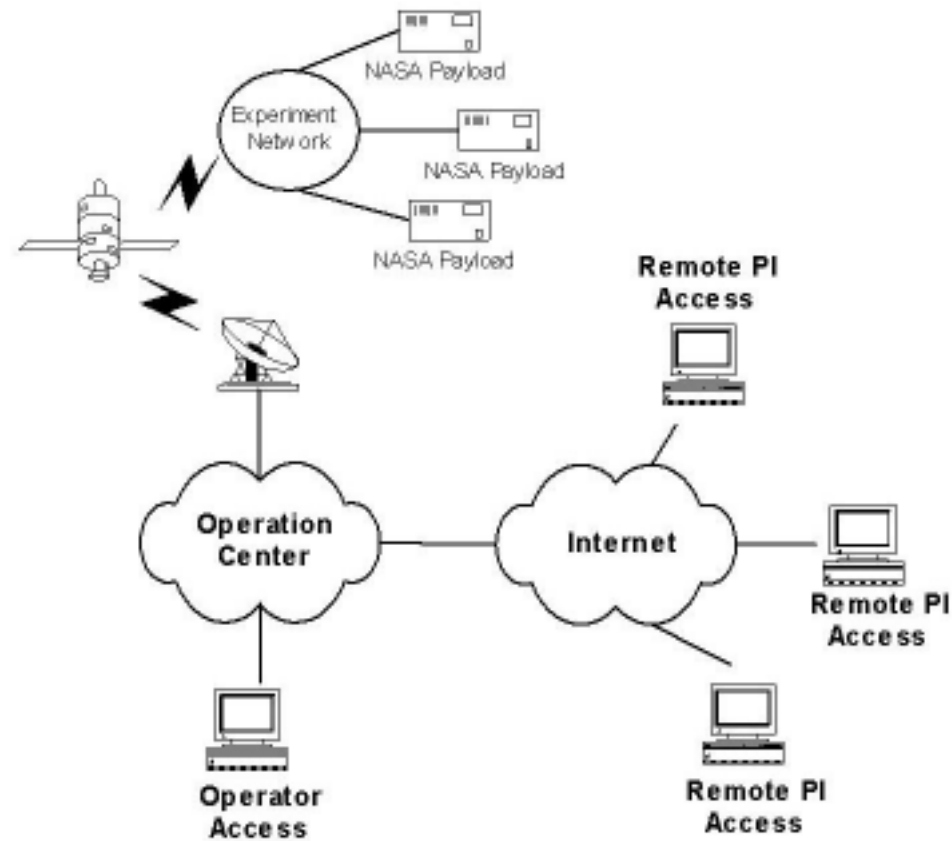
Introduction

➤ **Space Station Biological Research Project**
- ❖ **Habitat Holding Racks**
- ❖ **Centrifuge**
- ❖ **Life Science Glovebox**

➤ **Ames User Operation Facility (UOF)**
- ❖ **Payload Development Center**
- ❖ **Telescience Support Center**

➤ **Communication & Data System (CDS)**
- ❖ **System Infrastructure for Ames UOF**
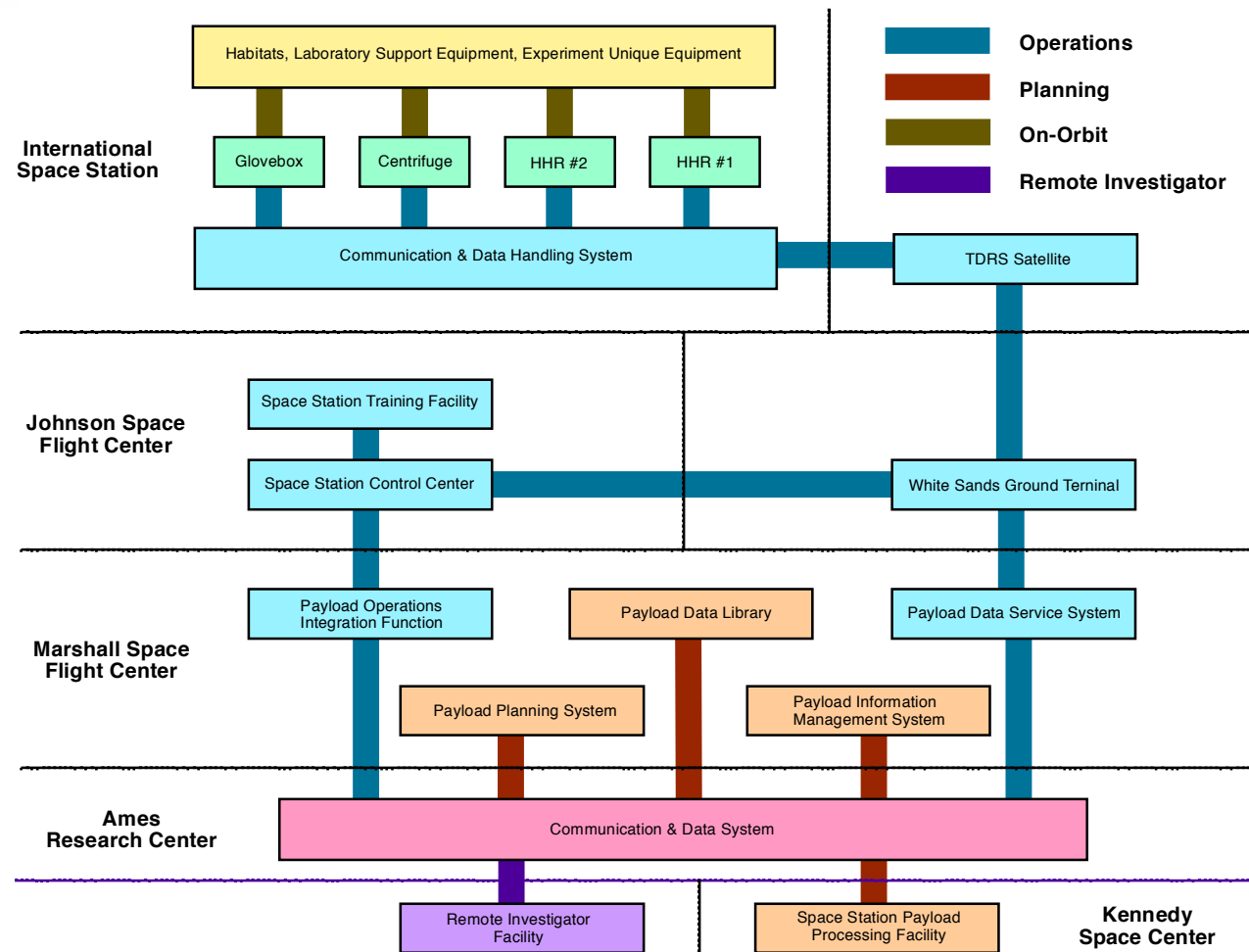
CDS Conceptual Infrastructure

Communication Infrastructure

Legend:
- Operations
- Planning
- On-Orbit
- Remote Investigator

International Space Station

Habitats, Laboratory Support Equipment, Experiment Unique Equipment

- Glovebox
- Centrifuge
- HHR #2
- HHR #1

Communication & Data Handling System

TDRS Satellite

Johnson Space Flight Center

Space Station Training Facility

Space Station Control Center

White Sands Ground Terminal

Marshall Space Flight Center

Payload Operations Integration Function

Payload Data Library

Payload Data Service System

Payload Planning System

Payload Information Management System

Ames Research Center

Communication & Data System

Remote Investigator Facility

Space Station Payload Processing Facility

Kennedy Space Center

Development Objectives

➤ **Mission Requirements**
- ❖ **Performance Requirements**
- ❖ **Interface Requirements**

➤ **Operational Efficiency**
- ❖ **Integrated Systems**
  - ● **Commanding**
  - ● **Telemetry**
  - ● **Planning**
- ❖ **User/Operator Interface**
  - ● **Reduce Training Requirements**
  - ● **Reduce Required Skill Level**

Development Philosophy

➢ **Philosophy**
- ❖ **Consider Operational & Development Costs**
- ❖ **Scaleable Architecture**
- ❖ **Stay on "Cutting Edge" not "Bleeding Edge"**
- ❖ **Maximize Use of Proven COTS Technology**
- ❖ **Use Common Platform Technologies**
- ❖ **Reduce Planning & Coordination Lead-time**
- ❖ **Security Built-In not Added-On**
- ❖ **Automate Routine Operator Actions**
- ❖ **Ease of Use to Reduce User Training**

Development Guidelines

➤ **Guidelines**
- ❖ **Concurrent Planning, Training, & Operations**
- ❖ **Integrated Operations Capability**
- ❖ **Generalists versus Specialists**
- ❖ **Operators Primary Controller/Monitor**
- ❖ **Crew Available for Manual Operations Only**
- ❖ **Human Resource & Travel Limitations**
- ❖ **Single Fault Tolerant Communications**

CDS Mission Requirements

Science

Support Multiple Experiments & Researchers
Provide Habitat Environmental Control
Support Remote Experiment Monitoring
Support Specimen Sharing
Provide Experiment Data Accessibility

Operations

Perform Concurrent Operations(24hrs x 7days)
Perform Integrated Planning
Provide Real-time Data Distribution
Provide Remote Researcher Presence at UOF
Perform Integrated Logistics

Security

Support Distributed Operations
Provide Data Partitioning by Researcher
Perform Internet Data Distribution
Implement Security Policy
Provide Computer/Network Security

Engineering
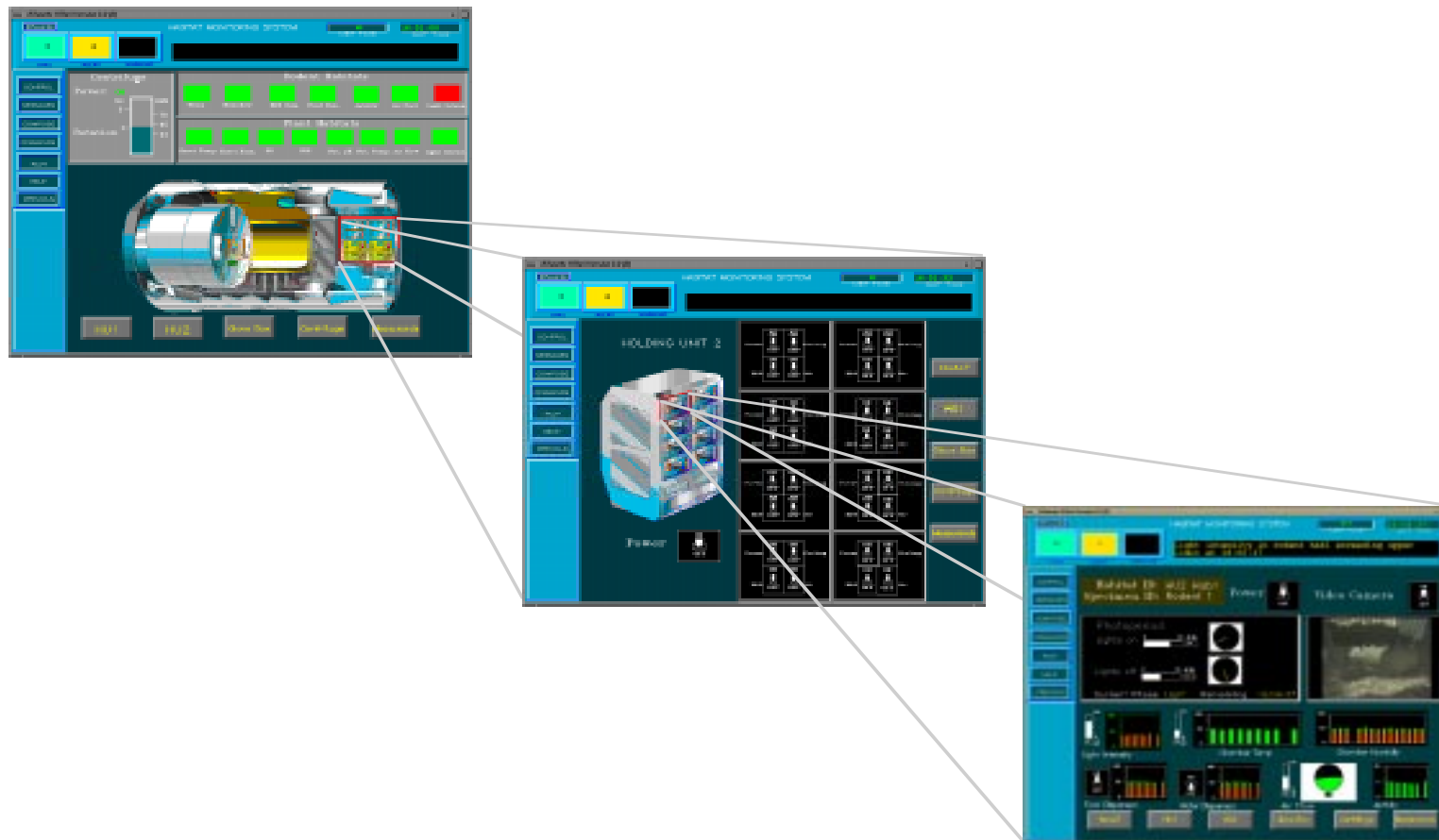
Provide Equipment Monitor & Control
Support Equipment Diagnostics
Provide Logistics & Inventory
Support Maintenance
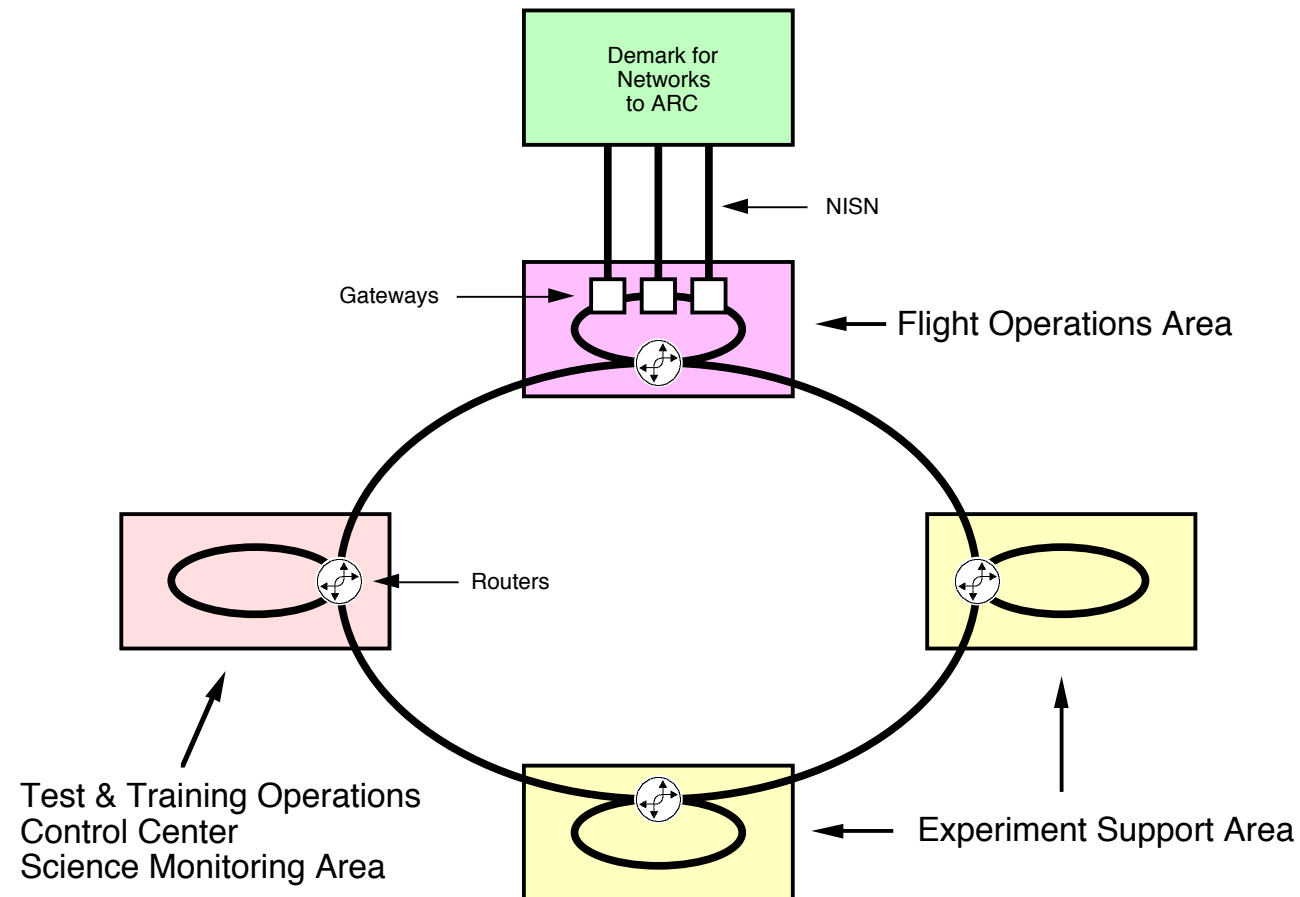Perform Development Verification

CDS User Interface Strategy

CDS Isolated FDDI Network

Demark for
Networks
to ARC

NISN

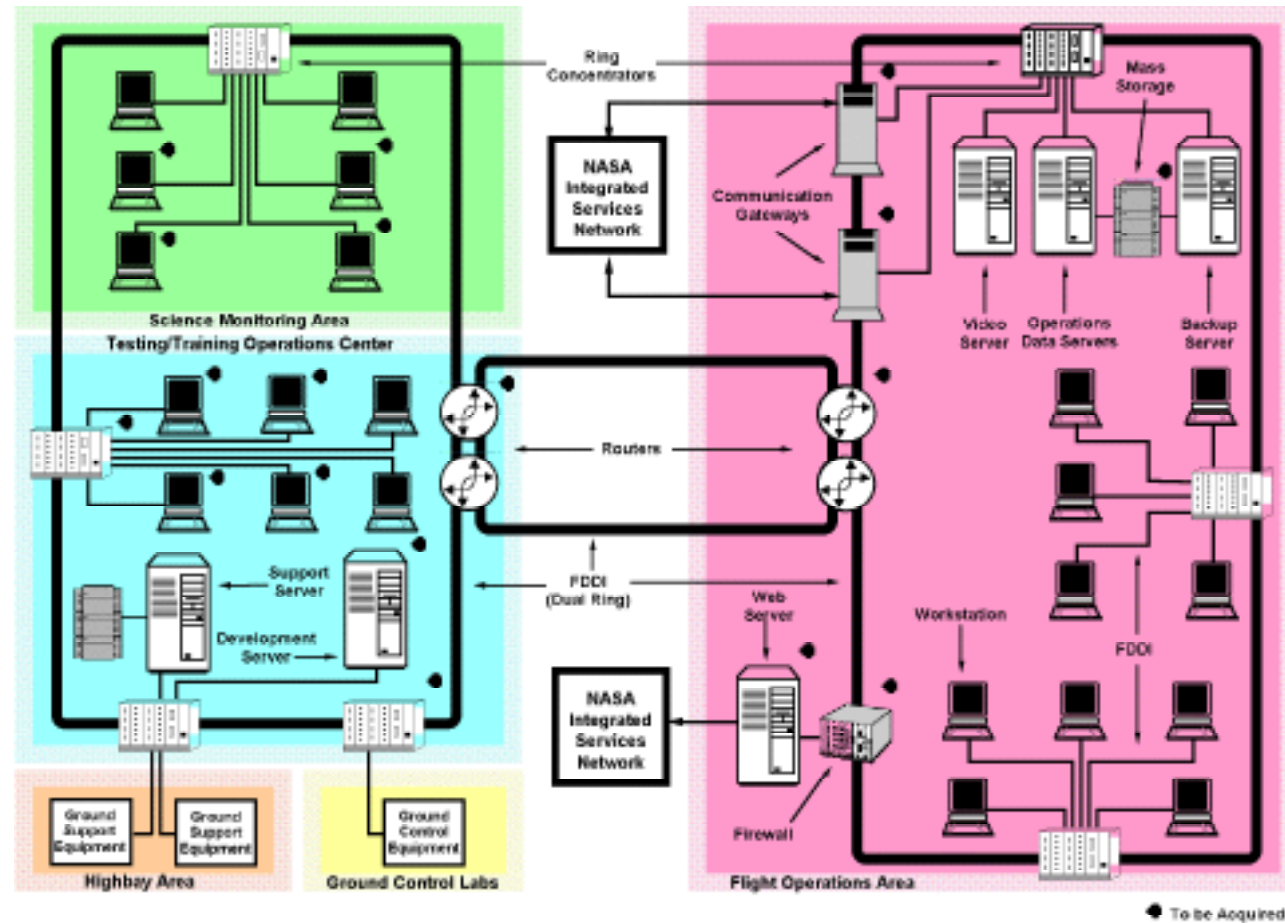Gateways

Flight Operations Area

Routers

Test & Training Operations
Control Center
Science Monitoring Area

Experiment Support Area

AMES USER OPERATIONS FACILITY

CDS Context Diagram
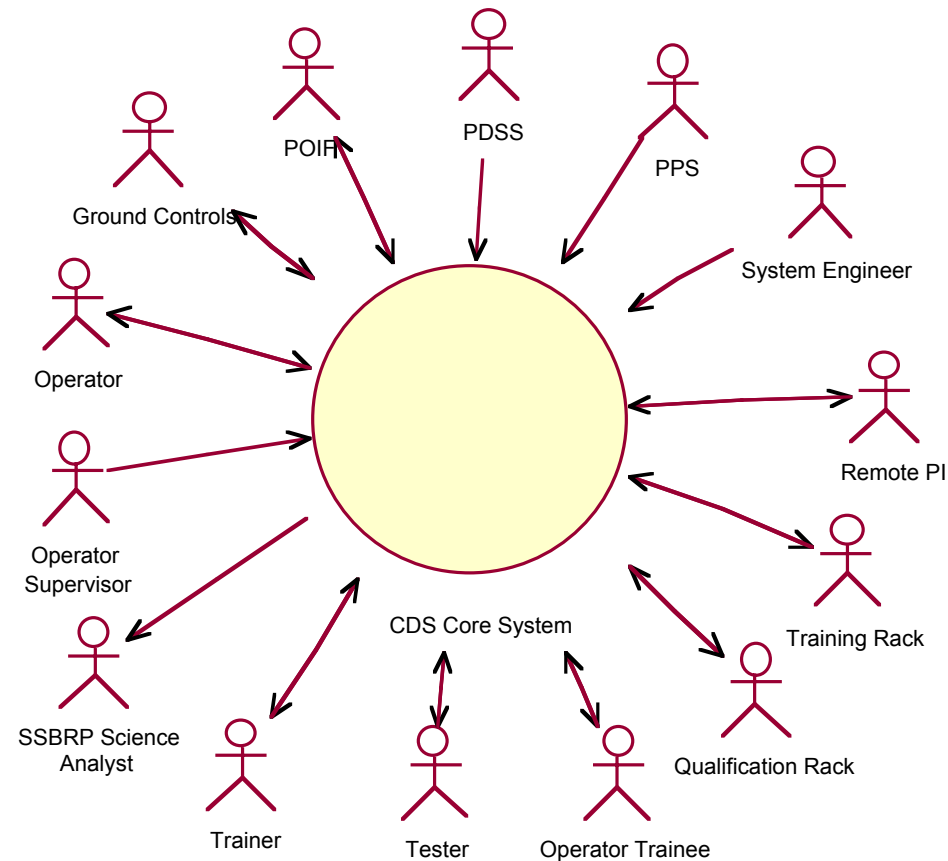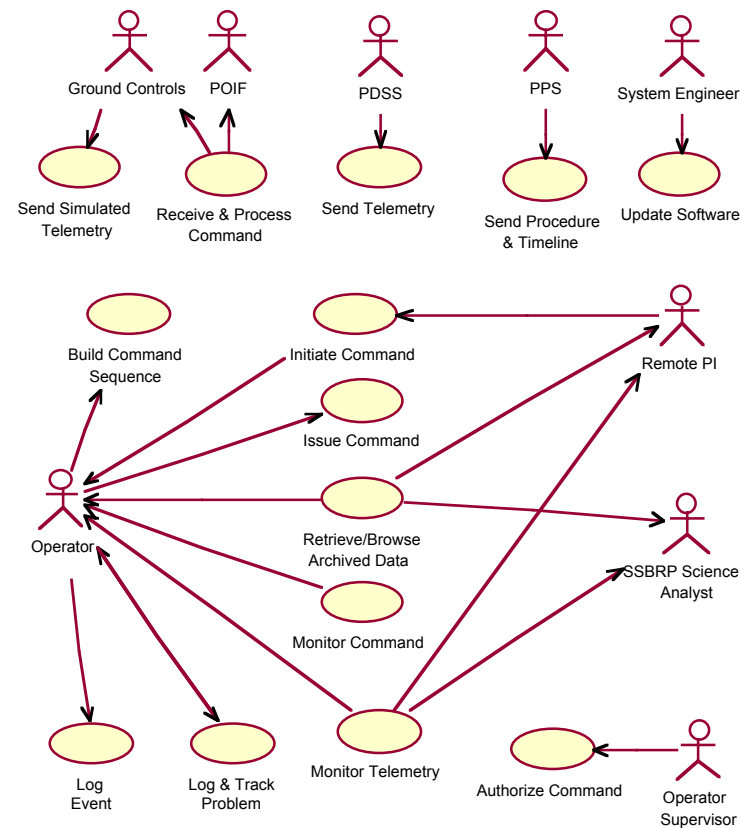
Development Products

Requirements Phase	Object Analysis Phase	Object Design Phase	Iterative Development Phase	Capability Testing Phase	Operations & Sustaining Eng. Phase
CDS Requirements Document	<u>Logical Model</u> Use Case Diagrams Object Message Diagrams Class Diagrams Object Diagrams Message Diagrams	<u>Physical Model</u> Class Diagrams Object Massage Diagrams <u>Static Model</u> Class Diagrams Object Design Diagrams <u>Dynamic Model</u> Message Trace Diagrams CDS Object Traceability Report	Code - Oracle - C++ - Java Updated Diagrams (Models) Updated CDS Object Traceability Report	CDS Test Plan Updated Documents & Diagrams	CDS Capabilities Document CDS Product Specification

Requirements Review   **Object Analysis Review**   **Object Design Review**   **Capability Test Review**

CDS Review Process

➤ **Conducted Using Interactive Web Technology**
   ❖ **Directly Linked to Development Information**

➤ **Content Accessible From Web Pages**
   ❖ **Requirements**
   ❖ **Object Models**
   ❖ **Traceability Report**
   ❖ **Project Status, Schedules, & Other Pertinent Information**

Conclusion

AMES USER OPERATIONS FACILITY

➤ **Object Oriented Approach**
  ❖ **Meets CDS Requirements**

➤ **Operational Efficiency**
  ❖ **Internal Process is Manageable**
  ❖ **External Interfaces Need Attention**

➤ **Technology Selection**
  ❖ **Cutting Edge**
  ❖ **Platform Independence**

➤ **Prototyping**
  ❖ **Requirements Definition**
  ❖ **Technology Evaluation**

Questions

For More Information See - http://geneve.arc.nasa.gov/CDS/home.html